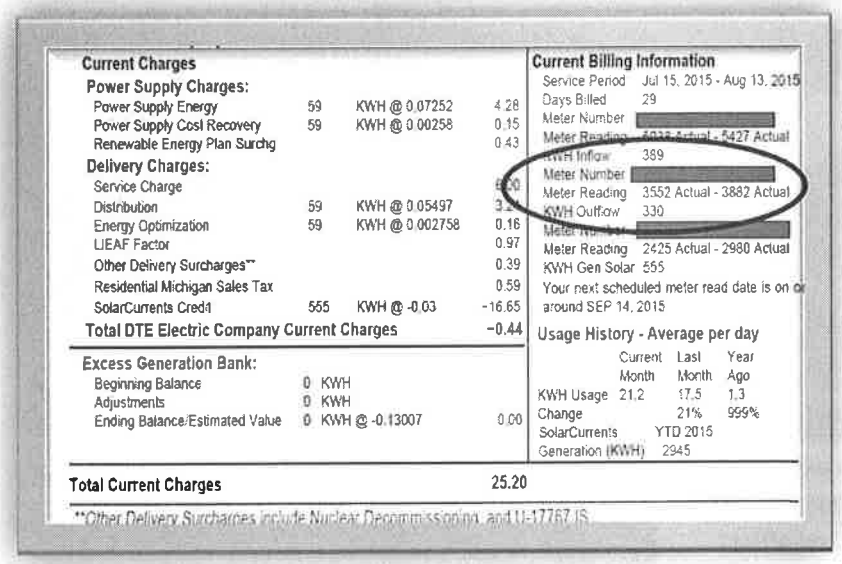
Net Metering and Full Reimbursement of the Utility

Without true net metering, based on the retail electric rate, the utilities are charging for services not rendered. When the electricity from a customer owned generator leaves the facility the electricity travels to the path of least resistance, which is the electric loads of the nearest neighbor. This is basic engineering: if you are an electron coming from one of these systems you aren't going to travel back to the coal, gas, or nuclear generator miles and miles away; you would have to fight to get there. Instead you will roll downhill and light the neighbor's lights and power their appliances. To get to those loads, this electricity will ***PASS THROUGH THE NEIGHBOR'S UTILITY METER***, and the neighbor will pay the ***full retail rate*** for their electricity, including that portion generated by the next door neighbor's system (Figures 1 and 2). When this neighboring rate payer pays the utility for their electricity at the full retail rate, with the second largest portion of that rate generally being delivery charges, the utilities are being paid for any costs incurred for delivery expenses.

Utilities seem to feel justified in not paying the delivery and other charges to the net metering rate payer because they would like to group the system owner in with other much larger wholesale energy providers operating within the old fashioned centralized grid system, pretending that these situations are the same, when in fact they are not remotely similar (Figures 3 thru 5).



Current Charges

Power Supply Charges:			
Power Supply Energy	59	KWH @ 0.07252	4.28
Power Supply Cost Recovery	59	KWH @ 0.00258	0.15
Renewable Energy Plan Surchg			0.43
Delivery Charges:			
Service Charge			[illegible]
Distribution	59	KWH @ 0.05497	3.2[illegible]
Energy Optimization	59	KWH @ 0.002758	0.16
LIEAF Factor			0.97
Other Delivery Surcharges**			0.39
Residential Michigan Sales Tax			0.59
SolarCurrents Credit	555	KWH @ -0.03	-16.65
Total DTE Electric Company Current Charges			**-0.44**

Excess Generation Bank:

Beginning Balance	0	KWH	
Adjustments	0	KWH	
Ending Balance/Estimated Value	0	KWH @ -0.13007	0.00

Total Current Charges 25.20

Current Billing Information

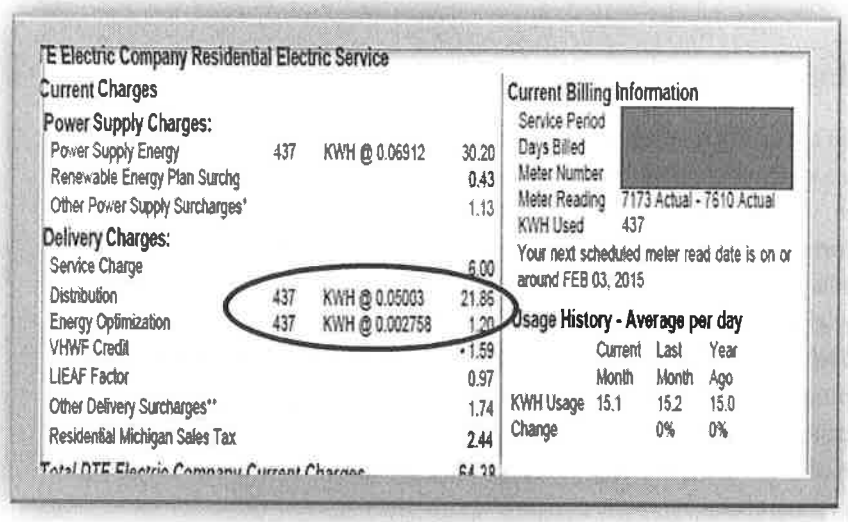
Service Period Jul 15, 2015 - Aug 13, 2015
Days Billed 29
Meter Number [redacted]
Meter Reading [illegible] Actual - 5427 Actual
KWH Inflow 389
Meter Number [redacted]
Meter Reading 3552 Actual - 3882 Actual
KWH Outflow 330
Meter Number [redacted]
Meter Reading 2425 Actual - 2980 Actual
KWH Gen Solar 555
Your next scheduled meter read date is on or around SEP 14, 2015

Usage History - Average per day

	Current Month	Last Month	Year Ago
KWH Usage	21.2	17.5	1.3
Change		21%	999%
SolarCurrents Generation (KWH)	YTD 2015 2945		

**Other Delivery Surcharges include Nuclear Decommissioning and U-17767 IS

Figure 1 shows that this family bought 389 kWh's from DTE when their system didn't meet the loads in the house. When their system exceeded the loads in the house and DTE didn't have to provide their electricity they exported 330 kWh's to their neighbor's house AND THEIR OWN OFFICE ON THE SAME PROPERTY! Read more below.



TE Electric Company Residential Electric Service

Current Charges

Power Supply Charges:			
Power Supply Energy	437	KWH @ 0.06912	30.20
Renewable Energy Plan Surchg			0.43
Other Power Supply Surcharges*			1.13
Delivery Charges:			
Service Charge			6.00
Distribution	437	KWH @ 0.05003	21.86
Energy Optimization	437	KWH @ 0.002758	1.20
VHWF Credit			-1.59
LIEAF Factor			0.97
Other Delivery Surcharges**			1.74
Residential Michigan Sales Tax			2.44
Total DTE Electric Company Current Charges			64.28

Current Billing Information

Service Period	
Days Billed	
Meter Number	
Meter Reading	7173 Actual - 7610 Actual
KWH Used	437

Your next scheduled meter read date is on or around FEB 03, 2015

Usage History - Average per day

	Current Month	Last Month	Year Ago
KWH Usage	15.1	15.2	15.0
Change		0%	0%

Figure 2 shows a neighbor's bill where they paid more than $0.05 per kWh for delivery charges. If 330 of those kWh's came from the neighbor's solar array then DTE has certainly been fully compensated for delivery expense. Net metering at Full Retail Rate is the simplest accounting system to adjust for this inflated price to the neighbor. The distribution expense is avoided because of the capital investment of the system owner, not the investment of the utility. The solar array cost much more than the overhead service wire to both homes (see Figure 4 below).

Figure 3 shows a solar array and the utility pole that the system sends power to. From there it goes to the neighbors' **meters** and the **meter** on the system owner's office space.

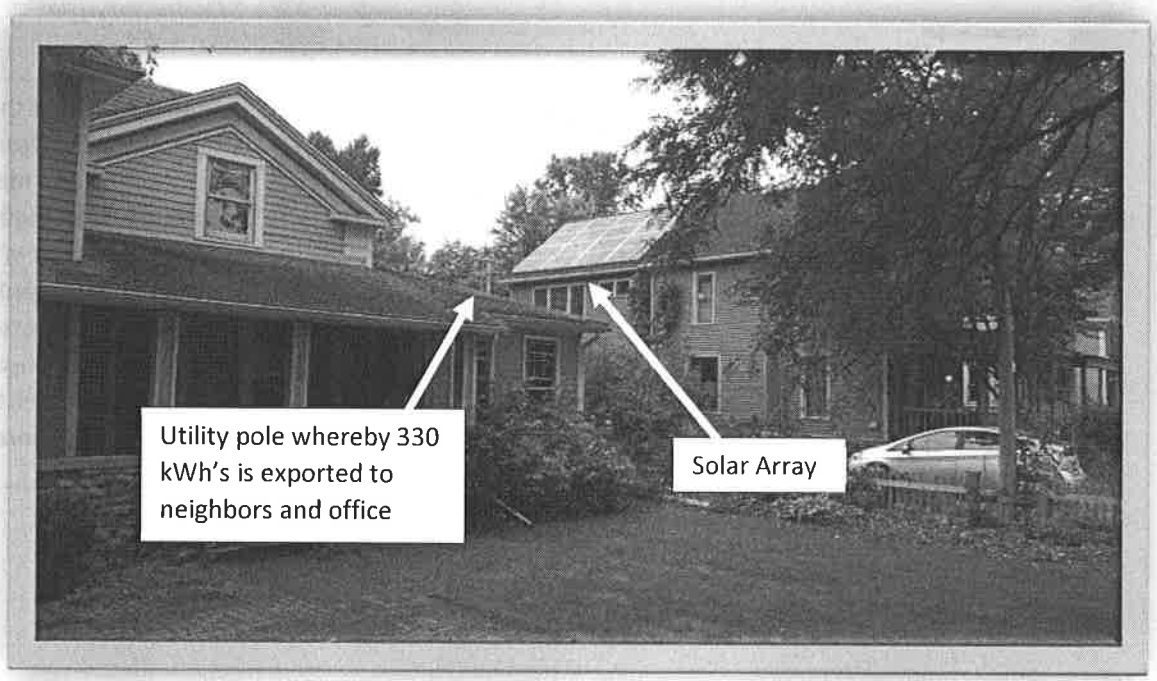
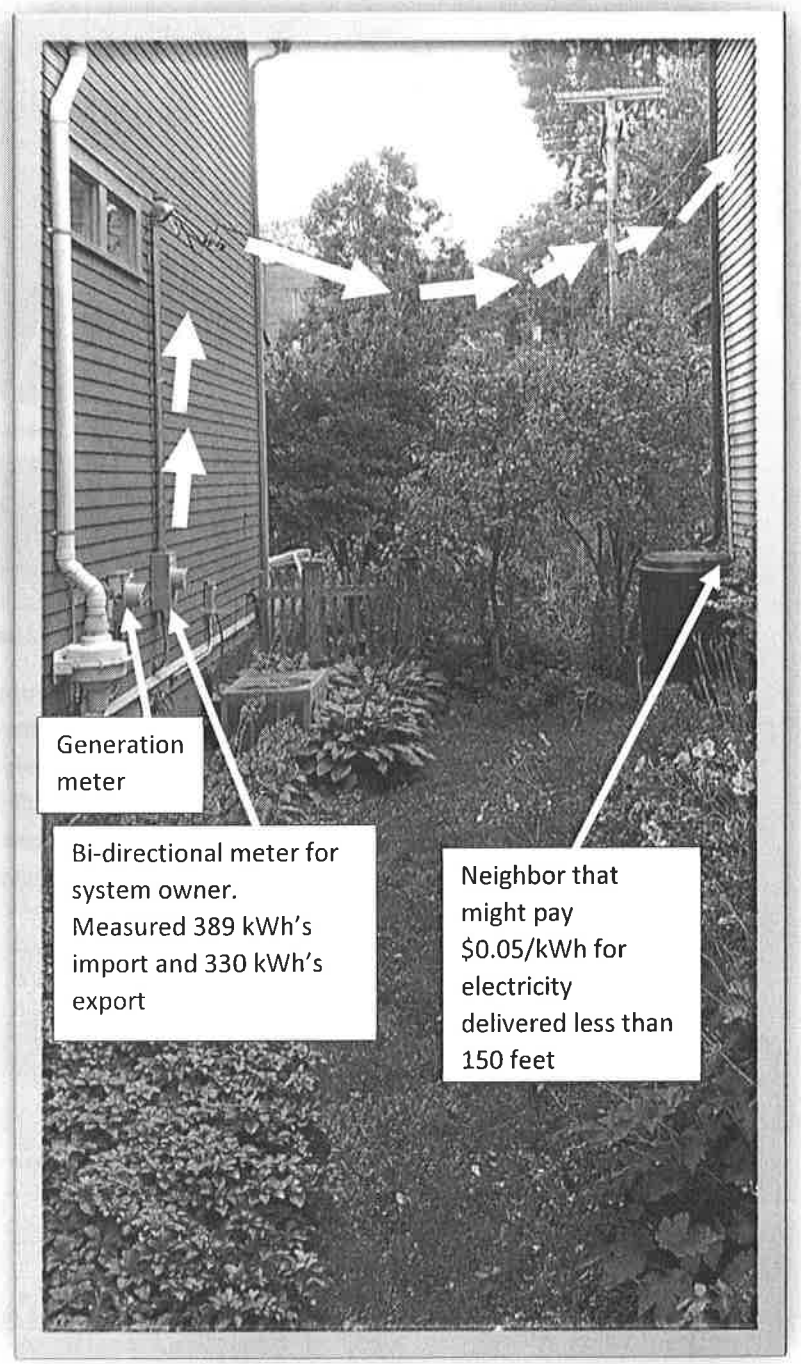


Figure 4 shows better than any other how short a distance the energy might travel before the utility collects $0.05 per kWh as the electricity travels through a neighbor's meter. In this case, a large portion of the 330 kWh's that left the residence on the left likely traveled through only about 150 feet of overhead wire. At $0.05 per kWh and 330 kWh's leaving the residence on the left, the utility collects $16.50 from the neighbors **IN A SINGLE MONTH**!

$0.05 per kWh delivery charge is a rate set with the PSC, and is based on the expenses of maintaining not just wire but all of the other equipment that goes into running this old fashioned centralized grid. None of that equipment is used to carry this power to the neighbors (read more details about that in the section below titled *Michigan Distributed Generation Past, Present, and Future).*

How can we be sure the energy travels in this localized manner? We know it to be true by the way the solar interacts with the house. The solar is connected inside the house on the left. When the solar generates the first loads it meets are those within the house, and satisfies those loads before it gets through the bidirectional meter and to the neighbors. Going to the nearest neighbors once it has left is analogous to how it behaves within the house, and is easily proven with the meters on site, and is a commonly understood principle by system experts.



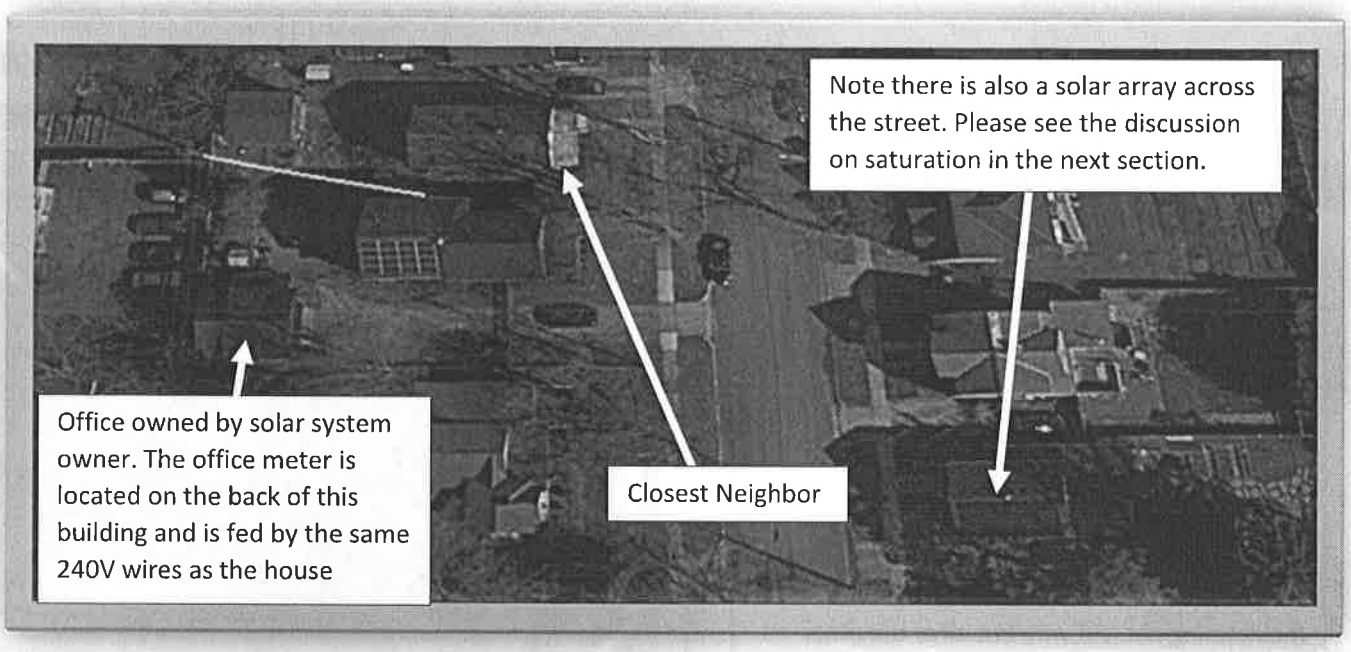
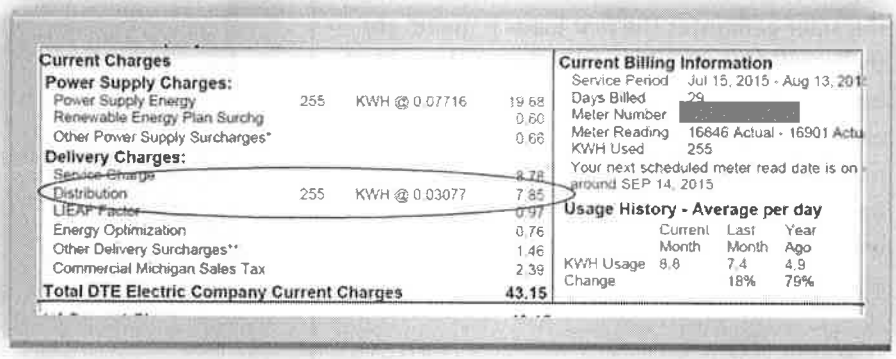


Figure 5 shows an aerial view of the property and other buildings on the street.

Throughout this document I am pointing out that most neighbors of systems owners more than cover the delivery cost incurred with a true retail rate based net metering program. In this case it is interesting that ***the system owner*** is paying delivery charges for electricity he has generated, and that passes between his home and office via only the 130 feet of utility wire. Note that$0.03/kWh is based on miles of cable and millions of dollars in equipment and maintenance. His office is on a different rate (business), so he is paying $0.03 rather than $0.05. See Figure 6 below.

Figure 6 shows the bill of the system owner that is paying delivery charges to the utility even though his capital investment to deliver some of this energy likely exceeds that of the utility. Please see the fuller discussion below.



Current Charges

Power Supply Charges:			
Power Supply Energy	255	KWH @ 0.07716	19.68
Renewable Energy Plan Surchg			0.60
Other Power Supply Surcharges*			0.66
Delivery Charges:			
Service Charge			8.78
Distribution	255	KWH @ 0.03077	7.85
LIEAP Factor			0.97
Energy Optimization			0.76
Other Delivery Surcharges**			1.46
Commercial Michigan Sales Tax			2.39
Total DTE Electric Company Current Charges			**43.15**

Current Billing Information

Service Period Jul 15, 2015 - Aug 13, 201
Days Billed 29
Meter Number [redacted]
Meter Reading 16646 Actual - 16901 Actu
KWH Used 255
Your next scheduled meter read date is on around SEP 14, 2015

Usage History - Average per day

	Current Month	Last Month	Year Ago
KWH Usage	8.8	7.4	4.9
Change		18%	79%

Michigan Distributed Generation, Past, Present, and Future

I installed my first grid connected piece of renewable energy equipment in Michigan back around September of 2004. That system costed three times what it would cost today, and nobody knew how significant distributed generation would be in Michigan. At that time, the interconnection procedure was to call a gentleman at DTE named Hawk, and tell him what inverter you were using (maybe email a spec sheet?). There was no fee for the service. This system, like all but one in Michigan, was "behind the meter", meaning it was sized so no generated electricity would possibly leave the building. No one back then would want to export power to the grid because there was no mechanism to be paid for this power, even though our equipment was capable, and the grid would have no problem, technical or otherwise, using the power. The procedure was simple for the installer, simple for the utility, and very inexpensive for them. We didn't install much at all back then, maybe one or two systems a year in the whole state.

Fast forward to 2008. Installations were up to several a year in the state of Michigan, but still much less than today's drop in the bucket. The cost of installation had dropped by maybe a third or so from the 2004 rate, so a few more people were interested. DTE had begun to push back on renewable energy installation, and tried to stop this one with "technical" objections to the installation, claiming that their grid could not handle this tiny installation at a single residence in a newish development. They claimed that a single two kilowatt residential system might bring down their grid, and asked for special equipment to be installed to protect it.

It was at this time that I began to learn a bit about how our equipment interacts with the grid, and how robust the interaction is. In areas of the world where grids were being run through their paces, primarily by large scale wind turbines in Europe, most grid operators did not begin to worry about the interaction until the saturation point got to around 15% (according to one of the world's top inverter engineers). The system DTE was opposing was only about 16% of the capacity of the HOUSE IT WAS INSTALLED IN, not to mention a thousand or so neighbors. This was my introduction to the fear and trepidation that our local utilities must have been experiencing.

Soon after this the bill that 438 tries to undo came into law. Now Michigan public utilities had a portfolio standard and would come to rely on us installers as "trade allies" to help get them the required installations to meet the standard. There was a boom in the state when DTE released monies for SolarCurrents and Consumer's started their EARP's program. This came at a time when other industries were depressed and decent jobs were much needed **(as they are today!)**. Those programs came and went and came and went again, and the cost of solar and large scale wind continued to fall. This was partly due to demand and competition in Michigan, but primarily because of product cost reduction due to world-wide economies of scale.

Now, it is still unusual in Michigan but there are some streets like the one in the photo above with more than a single grid connected solar array. The nation of Germany got 50% of their electricity from renewable sources for an entire hour, so grid operators around the world are getting nervous about the

changes that almost everyone agrees are imminent. What are the implications for the bill 438 and the current situation in Michigan? Almost nil.

Is it possible that distributed generation will cost Michigan rate payers extra? We would need to get to a much higher saturation rate, and at our current rate of change for net metering that would likely take about 200 years. (Currently .015% net metering, times 1000 to get to 15% saturation, divided by 5 since we have been installing net metered systems for roughly 5 years). OK, add in utility owned centralized renewables and 200 years may be an exaggeration, but the point here is clear. At current saturation levels there is no issue.

Does this sort of installation lower the current distribution cost to the utility? I don't know that at this point. Is it true, as some grid operators have claimed, that grid connected distributed generation equipment won't work without the grid? Of course it is. We need the grid, and have no renewable industry in Michigan without connecting to it. Is it then "fair" for a system user to have to pay delivery charges because their equipment won't turn on without a properly functioning grid? **ABSOLUTELY NOT!** As shown above these costs are more than covered by the value these systems provide to the utility and the neighbors, and the funds are already there. It should also be pointed out that a functioning grid at the system owner's location does not represent a single dollar in incremental cost to the utility. This is particularly true in Michigan where the system size is limited by the load at the site.

I believe that if the utilities are losing money on the net metering program it could only be true to the extent that they are unnecessarily driving up incurred expenses. I know that around the world, and in this country, grids will be bolstered and reinforced with distributed renewable energy systems. The long term outlook is a huge net savings for grid operation.

I hope that the Michigan legislature, PSC, and utilities will, like New York, embrace the opportunity distributed generation represents. Bill 438 represents Michigan sticking its head in the sand! Let us instead become the world leaders we should be.